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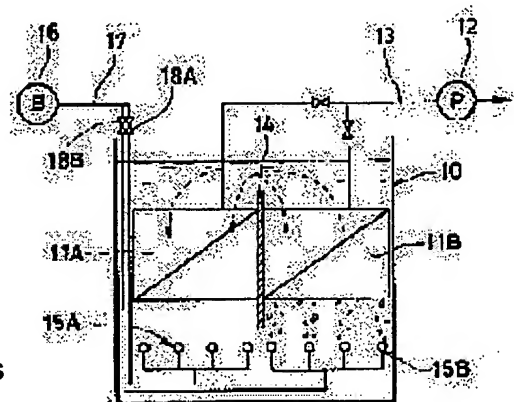
SAWADA SHIGEKI

## (54) IMMERSION MEMBRANE APPARATUS

### (57)Abstract:

**PURPOSE:** To effectively peel the non-filterable substance bonded to a membrane surface.

**CONSTITUTION:** In an immersion membrane apparatus wherein membrane units 11A, 11B are immersed in the liquid of a treatment tank 10 and the filtered treated water transmitted through the membranes of both units is obtained, the membrane units 11A, 11B are arranged in the liquid of the tank so as to be separated by a partition plate 14 and air diffusing devices 15A, 15B are individually installed under the individual membrane units and made alternately operable.



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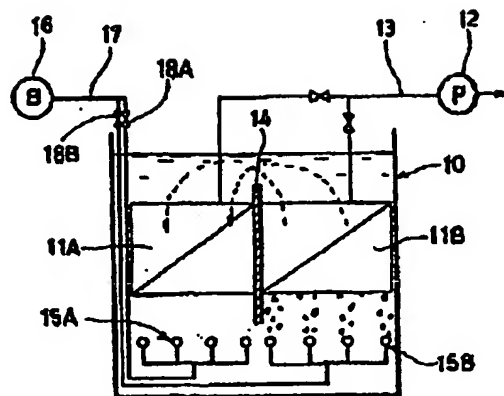
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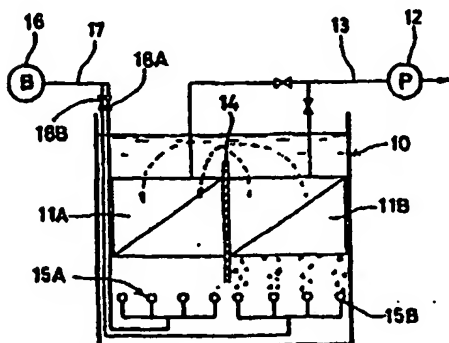
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(57) 【要約】

【目的】 膜面に付着した非透過物質を膜面から効果的に剥離する。

【構成】 処理槽 10 の液中に膜ユニット 11 を浸漬し、膜を透過した透過処理水を得る浸漬膜装置において、複数の膜ユニット 11 A、11 B を液中の仕切板 14 で隔てて槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に散気装置 15 A、15 B を設け、散気装置を交互に作動可能にする。



【特許請求の範囲】

【請求項 1】 処理槽の液中に膜ユニットを浸漬し、膜を透過した透過処理水を得る浸漬膜装置において、複数の膜ユニットを液中の仕切板で隔てて槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に散気装置を設け、散気装置を交互に作動可能にしたことを特徴とする浸漬膜装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 この発明は、平膜を複数枚積層した積層体や、中空糸膜を平面状、或いはすだれ状にした膜エレメントを複数枚積層した積層体や、管状膜を複数本並行に接続したものを膜ユニットとして用いた浸漬膜装置に関する。

【Patent Attorney】

(57) 【Abstract】

【Objective】 Rejected matter which deposits in film surface it peels off from film surface in the effective.

【Constitution】 As it soaks membrane unit 11 in liquid of treatment tank 10, separating membrane unit 11A, 11B of multiple with partition 14 in liquid in permeation membrane module which obtains the filtered water which transmitted membrane, it arranges in tank internal liquid, it provides air disperser 15A, 15B individually in downward direction of individual membrane unit, makes air disperser alternately operation possible.

【Claim(s)】

【Claim 1】 As it soaks membrane unit in liquid of treatment tank, separating membrane unit of multiple with partition in liquid in permeation membrane module which obtains the filtered water which transmitted membrane, it arranges in tank internal liquid, the permeation membrane module which designates that it provides air disperser individually in the downward direction of individual membrane unit, air disperser alternately operation it makes possible as feature.

【Description of the Invention】

【0001】

【Field of Industrial Application】 As for this invention, laminate which flat membrane multiple sheet is laminated and, laminate which membrane element which hollow fiber membrane is made flat surface or therian multiple sheet is laminated and, it regards permeation membrane module which uses those which tubular membrane multiple in parallel are connected as

[0002]

【従来の技術】処理槽の液中に上述した膜ユニットを浸漬し、膜ユニットの内部を吸引して膜を透過した濾過処理水を得る浸漬膜装置は従来から公知である。又、膜の下側に散気装置を設け濾過ケーキを剥離させることも公知である。

[0003]

【発明が解決しようとする課題】この浸漬膜装置を運転して膜濾過を行うと、膜面には濃度分極層、ゲル層、ケーキ層などの非透過物質が付着する。そして、非透過物質の厚さが増すと濾過抵抗が増大し、濾過圧力が高まって濾過効率は著しく低下する。このため膜ユニットの下方に散気装置を設け、一定時間膜濾過運転を行ったら、又は膜濾過運転中に一定濾過圧力になったら、運転を中止して逆洗を行うが、この逆洗の前後に散気装置を作動し、膜ユニットの下面全体に下から気泡を溶け込ませ、膜の両を上向する気泡と、上向水流の剪断力で膜面に付着した非透過物質を剥離する必要がある。この場合、膜ユニットの回りに槽内の液が下向流して循環する対流スペースを保つことが必要で、処理槽内への膜の充填率がその対流スペース分だけ減少することになる。

[0004]

【課題を解決するための手段】そこで本発明は、処理槽の液中に膜ユニットを浸漬し、膜を透過した濾過処理水を得る浸漬膜装置において、複数の膜ユニットを液中の仕切板で隔て、槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に散気装置を設け、散気装置を交互に作動可能にしたことを特徴とする。

[0005]

【実施例】図示の各実施例において、10は処理槽で、処理槽の液中には膜ユニット11が浸漬しており、ポンプ12を接続した吸引管13が膜ユニットの内部を吸引し、処理槽内の原液中、膜ユニット11を透過したものを濾過処理水として排水する。膜ユニットは、前述したように平膜の複数枚の

membrane unit.

[0002]

[Prior Art] Membrane unit which description above is done was soaked in liquid of treatment tank, inside of membrane unit was absorbed and permeation membrane module which obtains filtered water which membrane was transmitted is public knowledge from until recently. air disperser is provided in bottom of also, membrane and also fact that the filter cake is exfoliated is public knowledge.

[0003]

[Problems to be Solved by the Invention] Driving this permeation membrane module, when it does membrane filtration, concentration polarized layer, gel layer and the cake layer or other rejected matter deposit in film surface. When and, thickness of rejected matter increases, filtration resistance increases, the filtration pressure increases and filtration efficiency decreases considerably. Because of this in downward direction of membrane unit air disperser to provide, When constant time membrane filtration operation is done, or in membrane filtration operation becomes fixed filtration pressure, discontinuing driving, it does reverse washing, but air disperser it operates on front and back of this reverse washing, in bottom surface entirety of membrane unit pours the gas bubble from under, rejected matter which with shear stress of gas bubble and the upper direction water stream which between membrane upper direction are done deposits in film surface it is necessary to peel off. In this case, liquid of inside tank downwardly directed stream doing the around membrane unit, being necessary to maintain countercurrent space which circulates fill factor of membrane to inside treatment tank just countercurrent space portion means to decrease.

[0004]

[Means to Solve the Problems] Then as this invention soaks membrane unit in liquid of treatment tank, separating membrane unit of multiple with partition in liquid in the permeation membrane module which obtains filtered water which transmitted membrane, arranges in the tank internal liquid, it provides air disperser individually in downward direction of the individual membrane unit, air disperser alternately it designates that it makes operation possible as feature.

[0005]

[Working Example(s)] In each Working Example in illustration, 10 with treatment tank, membrane unit 11 is soaked in liquid of treatment tank, suction pipe 13 which connects pump 12 absorbs inside of membrane unit, water sample does in starting liquid inside the treatment tank, with those which

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膜層、又は中空糸膜を平面状、或いはすだれ状にした膜エレメントの複数枚の膜層、又は管状膜を複数本並行に接続したものである。

[0006] 図1の実施例では、処理槽10内に2つの膜ユニット11A、11Bを上端が液面下の仕切板14で隔て、隣接状に配置しており、各膜ユニット11A、11Bの下方には個々に散気装置15A、15Bが設けられている。4つの散気装置15A、15Bは共通のプロワー16に分岐管17で接続し、管に設けた開閉弁18A、18Bで個々に作動できるようにしている。膜透過運転を中止し、逆洗を行う前後に開閉弁18A、18Bを交互に開閉し、例えば散気装置15Aから15分間、気泡を膜ユニット11Aに溶けさせ、次の15分は散気装置15Bから気泡を膜ユニット11Bに溶けさせ、これを繰り返す。これにより散気装置15Aから上昇する気泡によって膜ユニット11Aの膜の面には上向流が生じ、気泡と上向水流により膜ユニット11Aの膜面に付着した非透過物質は膜面から剥離し、同時に膜ユニット11Bの膜面には下向流が生じ、この下向水流によって膜面に付着した非透過物質が剥離される。散気装置15Bが作動しているときは上記とは逆に膜ユニット11Bの膜面に付着した非透過物質は気泡と上向水流により膜面から剥離し、膜ユニット11Aの膜面に付着した非透過物質は膜面に生じた下向水流で膜面から剥離する。尚、散気は膜の運転を中止して行っても、膜の運転中に行ってもよい。

[0007] 図2の実施例では、処理槽10内に4つの膜ユニット11A、11B、11C、11Dを三枚の仕切板14A、14B、14Cで隔て、隣接状に配置しており、各膜ユニットの下方には個々に散気装置15A、15B、15C、15Dが設けられている。4つの散気装置は共通のプロワー16に分岐管17で接続し、分岐管に設けた4つの開閉弁18A、18B、18C、18Dで4つの散気装置を個々に作動することができる。膜透過運転を行っている間、或いは運転を中止し、逆洗の前後に開閉弁を操作し、例えば散気装置15A、15B、15C、15Dの順に15分間作動させたり、或いは15Aと15C、15Bと15Dを15分間交互に作動させる。作動している散気装置の上の膜ユニットの膜面には気泡による上向流が生じ、気泡と上向水流が膜面に付

transmitted membrane unit 11 as filtered water. As for membrane unit, way you mention earlier, laminate of multiple sheet of the flat membrane. Or laminate of multiple sheet of membrane element which hollow fiber membrane is made the flat surface or rattan. Or it is something which tubular membrane multiple in parallel is connected.

[0006] With Working Example of Figure 1, inside treatment tank 10 upper edge separating the 2 membrane unit 11A, 11B with partition 14 under liquid surface, it is arranged in adjacent, their air disperser 15A, 15B is provided individually in downward direction of each membrane unit 11A, 11B. You connect air disperser 15A, 15B of 4 to common blower 16 with manifold 17, you are designed in such a way that it can be operated individually with opening and closing valve 18A, 18B which is provided in tube. membrane filtration operation is discontinued, opening and closing valve 18A, 18B is opened and closed alternately on front and back which does reverse washing, 15 min and gas bubble are poured to membrane unit 11A from for example air disperser 15A, following 15 min pours the gas bubble to membrane unit 11B from air disperser 15B, repeats this. Because of this upwards flow occurs between membrane of membrane unit 11A due to the gas bubble which floating is done from air disperser 15A, rejected matter which deposits in film surface of membrane unit 11A with gas bubble and upper direction water stream peels off from film surface, downwardly directed stream occurs simultaneously between membrane of membrane unit 11B, rejected matter which deposits in film surface with this downward water stream is exfoliated. When air disperser 15B operates, being opposite to description above, therejected matter which deposits in film surface of membrane unit 11B peels off from the film surface with gas bubble and upper direction water stream, rejected matter which deposits in film surface of membrane unit 11A peels off from film surface with the downward water stream which it occurs between membrane. Furthermore diffused air discontinuing driving membrane, also doing it may do on on stream of membrane.

[0007] With Working Example of Figure 2, inside treatment tank 10 it separates membrane unit 11A, 11B, 11C, 11D of 4 with three partition 14A, 14B, 14C and is arranged in adjacent, air disperser 15A, 15B, 15C, 15D is provided individually in downward direction of each membrane unit. You can connect air disperser of 4 to common blower 16 with the manifold 17, air disperser of 4 you can operate individually with the opening and closing valve 18A, 18B, 18C, 18D of 4 which is provided in manifold. While doing membrane filtration operation, or it discontinues driving, operates opening and closing valve on front and back of reverse washing, 15 min address operates in order of the for example air disperser 15A, 15B, 15C, 15D, or 15A and 15C, 15B and 15D operates in 15 min arm alternation.

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着した非透過物質を剥離し、作動していない散気装置の上の膜ユニットの膜面には下向き流が生じ、この下向き流が膜面に付着した非透過物質を膜面から剥離する。

[0008]

【発明の効果】 以上で明らかなように、散気装置を交互に作動することで、作動している散気装置の上の膜ユニットの膜面には気泡による上向き流が生じ、気泡と上向き流とにより膜面に付着した非透過物質を剥離する。そして、作動を中止している散気装置の上の膜ユニットの膜面には下向き流が生じ、この下向き流が膜面に付着した非透過物質を剥離する。従って、下向き流を生じさせる対流スペースを膜ユニットの間に保つ必要がなくなるので、処理槽への膜充填率が高まる。又、同じ数の膜ユニットを充填する場合、使用する処理槽の大きさは大幅に小型化する。

【図面の簡単な説明】

【図1】 本発明の浸漬膜装置の第1実施例の断面図である。

【図2】 本発明の浸漬膜装置の他の1実施例の断面図である。

【符号の説明】

- 10 処理槽
- 11A 膜ユニット
- 11B 膜ユニット
- 11C 膜ユニット
- 11D 膜ユニット
- 12 ポンプ
- 13 吸引管
- 14 仕切板
- 14A 仕切板

Between membrane of membrane unit on air disperser which operates upwards flow due to gas bubble occurs, rejected matter where gas bubble and upper direction water stream deposit in film surface peels off, downwardly directed stream occurs between membrane of membrane unit on air disperser which does not operate there rejected matter where this downward water stream deposits in film surface peels off from the film surface.

[0008]

[Effects of the Invention] Way it is clear at above, air disperser by fact that it operates alternately, between membrane of membrane unit on air disperser which operates upwards flow due to gas bubble causes, rejected matter which deposits in film surface with with gas bubble and upper direction water stream peel off. And, downwardly directed stream occurs between membrane of membrane unit on air disperser which discontinues operation rejected matter where this downward water stream deposits in film surface peels off. Therefore, because necessity to maintain countercurrent space which causes the downwardly directed stream between membrane unit is gone, membrane fill factor to treatment tank increases. greatly miniaturization it does size of treatment tank which when it is filled, uses the membrane unit of also, same number.

[Brief Explanation of the Drawing(s)]

[Figure 1] It is a cross section of 1st Working Example of permeation membrane module of this invention.

[Figure 2] It is a cross section of other 1 Working Example of permeation membrane module of this invention.

[Explanation of Reference Signs in Drawings]

- 10 treatment tank
- 11A membrane unit
- 11B membrane unit
- 11C membrane unit
- 11D membrane unit
- 12 pump
- 13 suction pipe
- 14 partition
- 14A partition

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14B 仕切板

14C 仕切板

16A 散気装置

16B 散気装置

16C 散気装置

16D 散気装置

16 ブロー

17 分岐管

18A 開閉弁

18B 開閉弁

18C 開閉弁

18D 開閉弁

14B partition

14C partition

15A air disperser

15B air disperser

15C air disperser

15D air disperser

16 blower

17 manifold

18A opening and closing valve

18B opening and closing valve

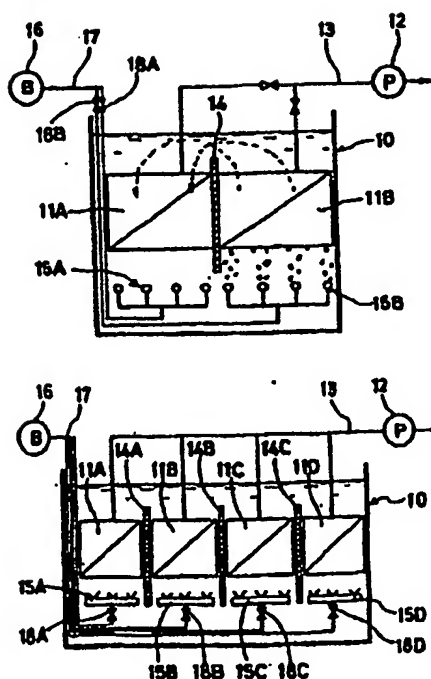
18C opening and closing valve

18D opening and closing valve

D4

[図1]

[Figure 1]



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(図2)

[Figure 2]

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